

# DANIEL PAUL MAES

University of Michigan Department of Mathematics - Ann Arbor, MI, USA

## EDUCATION

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### University of Michigan, Ann Arbor

PhD in Applied and Interdisciplinary Mathematics

May 2025

Ostling Lab Member

January 2020 - Present

Graduate Certificate in Complex Systems

May 2023

M.S. in Applied and Interdisciplinary Mathematics

May 2, 2020

Valdovinos Lab Member

Winter 2019 - August 2020

Marjorie Lee Browne Scholar

Fall 2018 - Winter 2020

### Williams College

B.A. in Mathematics (with Honors) and Statistics

June 3, 2018

Honors Thesis in Mathematics

Fall 2017 - Spring 2018

SIAM, Williams Chapter Member/Board Member

Fall 2016 - Spring 2018

AMS, Williams Chapter Member/Vice President

Fall 2016 - Spring 2018

Mellon Mays Undergraduate Fellow

Spring 2016 - Spring 2018

## COURSES TAUGHT

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- MATH 105 - Data, Functions, and Graphs (University of Michigan, Fall 2018)
- MATH 115 - Calculus I (University of Michigan, Winter 2019/Fall 2019)

## RESEARCH EXPERIENCE

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### Ostling Lab

January 2021 - Present

*Graduate Student Research Project, PhD*

- The [Ostling Lab](#) studies competitive coexistence and its effects on ecological communities. A key focus is on understanding the mechanisms of competitive coexistence, how competition influences community structure and diversity, and what insights observed patterns of community structure might provide about competitive coexistence.
- Our project focuses on expanding the modeling theory for intransitive loops of competition. Our goal is to further establish intransitivity as another widespread interaction motif in ecological literature and to show how the structure can help foster stability and higher diversity in communities.

### Valdovinos Lab

May 2019 - August 2020

*Graduate Student Research Project, M.S.*

- The [Valdovinos Lab](#) studies the structure and dynamics of ecological networks at ecological and evolutionary scales. A key focus is on understanding anthropogenic effects on species existence.
- Our project focused on developing a more mechanistic and structured underlying theory on mutualistic interactions in ecology, rather than relying on current, more phenomenologically-based models.
- This work culminated in a master's capstone project.

### American Institute of Mathematics Summer School

June 2020 - July 2020

*Summer Research Program on: Dynamics, Data and the COVID 19 Pandemic*

- This NSF funded summer school focused on pairing undergraduates and graduate students with faculty around the world to focus on furthering the work of COVID research in the midst of the pandemic.

- Our work focused on modeling the disproportionate spread of COVID between different racial/ethnic groups in several U.S. states by tracking and modeling the basic reproductive number ( $R_t$ ) over time.

**Mellon Mays Undergraduate Fellowship (MMUF)**

June 2016 - June 2018

*Undergraduate Research Fellowship*

- MMUF is a funded research fellowship, aimed to help underrepresented minorities in academia pursue their doctorate degrees and careers in the professoriate.
- Worked on a research project titled *Understanding Critical Mass at UC Berkeley: Creating Predictive Models for Affirmative Action Policies in Undergraduate Admissions in the United States*.
- Used predictive models to assess the efficacy of specific affirmative action policies.

**NCSU REU: Modeling and Industrial Applied Mathematics**

May 2017 - August 2017

*Undergraduate Summer Research Project*

- Participated in a small group focused on financial mathematics research.
- Found optimal investment strategies for Leveraged Exchange-Traded Funds (ETFs).
- Created a poster which was displayed in an undergraduate research symposium at the end of the REU.

**PUBLICATIONS**

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- Hale, K. R. S., Maes, D. P., & Valdovinos, F. S. (2022). Simple Mechanisms of Plant Reproductive Benefits Yield Different Dynamics in Pollination and Seed Dispersal Mutualisms. In *The American Naturalist* (Vol. 200, Issue 2, pp. 202216). University of Chicago Press. doi: [10.1086/720204](https://doi.org/10.1086/720204)
- Fleurantin, E., Sampson, C., Maes, D. P., Bennett, J., Fernandes-Nunez, T., Marx, S., & Evensen, G. (2021). A study of disproportionately affected populations by race/ethnicity during the SARS-CoV-2 pandemic using multi-population SEIR modeling and ensemble data assimilation. In *Foundations of Data Science* (Vol. 3, Issue 3, p. 479). American Institute of Mathematical Sciences (AIMS). doi: [10.3934/fods.2021022](https://doi.org/10.3934/fods.2021022)
- Maes, D. P., Tucher, J., & Topaz, C. M. (2021). Affirmative action, critical mass, and a predictive model of undergraduate student body demographics. In C. M. Danforth (Ed.), *PLOS ONE* (Vol. 16, Issue 5, p. e0250266). Public Library of Science (PLoS). doi: [10.1371/journal.pone.0250266](https://doi.org/10.1371/journal.pone.0250266)

**FELLOWSHIPS & FUNDING**

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**Rackham Merit Fellowship - Rackham Science Award**

~\$48,559

*University of Michigan, Rackham Graduate School*

*Fall 2023 - Winter 2025*

- The Rackham Merit Fellowship Program at the University of Michigan helps sustain the academic excellence and inclusiveness of the Michigan graduate community by offering financial assistance to students in an effort to reduce disparities in graduate education.

**NSF Graduate Research Fellowship**

\$138,000

*National Science Foundation*

*Fall 2020 - Summer 2023*

- The National Science Foundation's Graduate Research Fellowship Program offers 3 years of fellowship funding to a select number of graduate students in a variety of scientific fields.

**Summer Research Support**

\$7,000

*American Institute of Mathematics*

*Summer 2020*

- The American Institute of Mathematics hosts several workshops and summer schools to provide undergraduate and graduate students opportunities to expand their mathematical knowledge and research skills. This summer school focused on COVID modeling and research.

**Marjorie Lee Browne Fellowship**

\$10,890

*University of Michigan, Department of Mathematics*

*Winter 2020*

- The Marjorie Lee Browne Fellowship program is a funded masters bridge program for underrepresented minorities in mathematics. The final semester of the program is funded through a research fellowship.

**SIAM Student Travel Award**

\$650

*Society for Industrial and Applied Mathematics*

*May 2019*

- Travel grant awarded to student attendees and/or presenters at the 2019 SIAM Conference on Applications of Dynamical Systems held in Snowbird, Utah.

## HONORS & AWARDS

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- **Ford Foundation Fellowship Honorable Mention.** Honorable Mention for the Ford Foundation Predoctoral Fellowship. March 2018 and March 2020.
- **Outstanding Presentation Award.** Mathematical Association of America undergraduate paper session at MathFest 2018. Denver, Colorado. August 2, 2018.
- **Williams College Morgan Prize in Mathematics.** To a senior major with accomplishment and promise in applied mathematics, statistics, or mathematics teaching. Williams College Department of Mathematics & Statistics. June 2, 2018.
- **Sigma Xi (Associate Member), The Scientific Research Honors Society.** Inducted on June 2, 2018.
- **Honors Thesis, Mathematics.** Williams College Department of Mathematics & Statistics. May 2018.
- **Deans List.** Williams College. Spring 2016, Fall 2016, Fall 2017, and Spring 2018.
- **Outstanding Poster Award.** Mathematical Association of America undergraduate poster session at the 2018 Joint Mathematics Meeting. San Diego, California. January 13, 2018.
- **Institute for Recruitment of Teachers (IRT) Associate.** May 2017 - April 2018.
- **Mu Sigma Rho, The National Statistics Honorary Society.** Nominated by Professor Richard De Veaux, Williams College. Nomination accepted on March 24, 2017.
- **Academic Achievement List.** IFSA-Butler, Kings College London. Spring 2017.

## SELECTED TALKS, PRESENTATIONS, & POSTERS

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- **Symmetric intransitive loop competition can lead to stable coexistence for odd but not even numbers of species.** 2023 Ecological Society of America Annual Meeting. Portland, OR. August 6-10, 2023.
- *Invited special-session talk:* **The Effects of Intransitive Loops of Competition on the Stability of Ecological Communities.** The 13th AIMS Conference on Dynamical Systems, Differential Equations and Applications. Wilmington, NC. May 31-June 4, 2023.
- **The ecological theory of mutualism: Models generalizing across different mechanisms.** 2020 Ecological Society of America Annual Meeting. Salt Lake City, UT/Virtual. August 3-6, 2020.
- *Invited mini-symposium talk:* **Creating Predictive Models for Racial Affirmative Action Policies in U.S. Undergraduate Admissions.** SIAM Conference on Applications of Dynamical Systems. Snowbird, Utah. May 22, 2019.
- **Using Markov Chains to Assess Critical Mass.** MAA MathFest 2018. Denver, CO. August 2, 2018.
- **Understanding Critical Mass at UC Berkeley: Creating Predictive Models for Affirmative Action Policies in Undergraduate Admissions in the United States.** Thesis Defense, Honors Thesis in Mathematics. Williams College Department of Mathematics. Williamstown, MA. May 7, 2018.
- **Optimal Investment Strategies and Portfolio Analysis of Leveraged Exchange-Traded Funds (LETFs).** AMS Joint Mathematics Meeting. San Diego, CA. January 12, 2018.
- **The Criticality of Critical Mass: Understanding Affirmative Action Policy in United States Undergraduate Admissions.** Mellon Mays Summer Colloquium. Williamstown, MA. July 20, 2016.

## PROFESSIONAL MEMBERSHIPS

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- American Mathematical Society (AMS)
- American Statistical Association (ASA)
- Society for Industrial and Applied Mathematics (SIAM)
- Ecological Society of America (ESA)
- Mu Sigma Rho, The National Statistical Honors Society
- Sigma Xi, The Scientific Research Honors Society

## SERVICE

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**Institute for the Quantitative Study of Inclusion, Diversity, & Equity** April 2019 - Present  
*Associated Partner*

- [The Institute for the Quantitative Study of Inclusion, Diversity, and Equity \(QSIDE\)](#) is a cross-institutional collaborative effort to use cutting-edge quantitative techniques to increase inclusion, diversity, and equity.
- Our mission is to bring together researchers from the humanities, social sciences, and natural sciences together with mathematical, statistical, and computer scientists to tackle such research interests.
- My current work is a continuation of my undergraduate thesis project on assessing affirmative action policies in use at U.S. undergraduate colleges and universities.

**Ross Summer Connection 2019**

June 2019 - August 2019

*Graduate Student Instructor*

- Ross Summer Connection is a program run by Ross Business School at the University of Michigan.
- This summer program is for underrepresented groups in business to get a jump start on their studies at U-M, in the hopes of setting them up for success while at Michigan.
- My responsibilities included teaching the Precalculus course to a group of 12 students and advising them on best practices for productivity and studying while in college.